

# BMJ Open Willingness of patients to use unused medication returned to the pharmacy by another patient: a cross-sectional survey

Charlotte Bekker,<sup>1,2</sup> Bart van den Bemt,<sup>1,3</sup> Toine CG Egberts,<sup>2,4</sup> Marcel Bouvy,<sup>4</sup> Helga Gardarsdottir<sup>2,4,5</sup>

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## ABSTRACT

**Objectives** Redispensing by pharmacies of medication unused by another patient could contribute to optimal use of healthcare resources. This study aimed to assess patient willingness to use medication returned by another patient and patient characteristics associated with this willingness.

**Design** Cross-sectional survey.

**Setting** A total of 41 community and 5 outpatient pharmacies in the Netherlands.

**Participants** Total of 2215 pharmacy visitors.

**Primary and secondary outcome measures** Patients completed a questionnaire regarding their willingness to use medication returned unused to the pharmacy by another patient, assuming quality was guaranteed. Secondary outcome measures included patient sociodemographic characteristics that were associated with patient willingness, analysed using logistic regression analysis and reported as ORs with 95% CIs.

**Results** Of the 2215 patients (mean (SD) age 50.6(18.0) years; 61.4% female), 61.2% were willing to use medication returned unused to the pharmacy by another patient. Patients who were unwilling mostly found it risky. Men were more willing to use returned medication (OR 1.3 95% CI 1.1 to 1.6), as did patients with a high educational level (OR 1.8 95% CI 1.3 to 2.5), those who regularly use 1–3 medications (OR 1.3 95% CI 1.1 to 1.7), those who returned medication to the pharmacy for disposal (OR 1.5 95% CI 1.0 to 2.3) and those who ever had unused medication themselves (OR 1.3 95% CI 1.1 to 1.6)). Patients with non-Dutch cultural background were less willing to use returned medication (OR 0.395 95% CI 0.3 to 0.4)).

**Conclusions** When quality is guaranteed, a substantial proportion of patients are willing to use medication returned unused to the pharmacy by another patient. This suggests that implementation of redispensing may be supported by patients.

## INTRODUCTION

Up to one-third of patients do not use all medication dispensed by their pharmacy,<sup>1 2</sup> leading to a waste of healthcare resources and potentially environmental pollution. Previous studies reported that 20%–90% of medication dispensed but unused by patients still are in their unopened and intact

## Strengths and limitations of this study

- This study included a large patient sample to assess their willingness to use redispensed medication.
- Patient groups who were more or less willing were identified.
- Patient willingness may not be identical if redispensing is implemented in practice.
- In-depth information on patient barriers and facilitators were not identified.

packaging.<sup>3–7</sup> Patients either dispose these unused medication at home (eg, household waste) or return these to pharmacies who discard these as special waste.<sup>8</sup> Redispensing these unused medication could contribute to waste-reduction. Although medication that remain unused by patients in healthcare institutions are occasionally redispensed to patients who cannot afford healthcare,<sup>9 10</sup> there is no standard practice,<sup>11</sup> primarily due to uncertainties surrounding the quality assurance of returned medication and legal constraints including product liability.

Stakeholders are positive regarding implementation of a redispensing process;<sup>12 13</sup> however, they explicitly stated that successful implementation relies heavily on patient support. A qualitative study with 19 participants from the UK showed that people would generally agree to use redispensed medication if safety and product quality is guaranteed.<sup>14</sup> Other surveys from the UK and the Netherlands showed that people would accept redispensed medication.<sup>15–17</sup> However, these studies involved small study populations and did not determine which patient groups would be more or less willing to use redispensed medication. This study therefore aims to assess patient willingness to use medication returned unused to the pharmacy by another patient and patient characteristics associated with this willingness.



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For numbered affiliations see end of article.

## Correspondence to

Dr Toine CG Egberts;  
[a.c.g.egberts@uu.nl](mailto:a.c.g.egberts@uu.nl)

## METHODS

A cross-sectional anonymous survey was conducted in 41 community pharmacies and five outpatient pharmacies, involved in the Utrecht Pharmacy Practice network for Education and Research (UPPER) network of the Utrecht University,<sup>18</sup> between April and December 2014 in the Netherlands (approved by the UPPER Institutional Review Board of the Utrecht University (UP1408)).

In each participating pharmacy, approximately consecutive 50 adult ( $\geq 18$  years and able to communicate in Dutch) visitors were approached by pharmacy students to complete a questionnaire in writing while waiting or orally in case of returning medication for disposal. Visitors were asked about their willingness to use medication returned unused to the pharmacy by another patient if the quality was guaranteed, with multiple answer options: 'yes, it is a shame to destroy good-quality medication'; 'yes, if this medication is cheaper or free'; 'no, I don't want secondhand medication'; 'no, I find it risky' or 'other'. Besides registering their sociodemographic characteristics age, gender, educational level ('low'/'medium'/'high') and cultural background ('Dutch'/'other'), visitors were asked whether they had ever had unused medication themselves ('yes'/'no'/'don't know'), and the number of prescription medications they regularly use ('none'/'1–3'/' $\geq 4$ '). The questionnaire was composed through discussion with the research group, pilot tested among patients in two community pharmacies on inclusion and patients' understanding. It was feasible to include 50 patients per pharmacy per day and no adjustments to the questionnaire were made. The questionnaire was also used in another study that assessed unused medication returned to community pharmacies. Participating patients who were returning unused medication for disposal were asked additional questions as part of a larger study.<sup>7</sup>

Data were presented in proportions or means with SD. Associations between patient characteristics and willingness to use returned medication (answers categorised into yes/no) were analysed in STATA V.13, using univariate and multivariate logistic regression analyses (full model with complete cases), reported as ORs with 95% CIs. To assess if hierarchical data structure (patients clustered within pharmacy) influenced our outcomes, multi-level sensitivity analysis was conducted.

## Patient involvement

Patients were not involved in the design of the study.

## RESULTS

A total of 2215 patients (mean (SD) age 50.6 (18.0) years, 61.4% female) participated, 88.8% of whom were community pharmacy visitors. Of all patients, 142 (6.4%) were returning medication for disposal. Most patients had a Dutch cultural background (77.8%), a medium educational level (48.2%) and regularly used 1–3 prescription

**Table 1** Patient willingness to use medication returned unused to the pharmacy by another patient

	Patients n=2215 (n, %)
Willing*	1355 (61.2)
Yes, it is a shame to destroy good-quality medication	1198 (88.4)
Yes, if this medication is cheaper or free	269 (19.9)
Other	35 (2.6)
Unwilling*	869 (39.2)
No, I find it risky	557 (64.1)
No, I don't want secondhand medication	357 (41.1)
Other	8 (0.9)

\*Patients could report multiple answers.

medications (45.9%). A total of 1436 (64.8%) patients had ever had unused medication themselves.

Over half of patients were willing to use medication returned unused to the pharmacy by another patient (61.2%, table 1). Of these, 88.4% was willing because they found it a shame to destroy good-quality medication and 19.9% if these were cheaper or free. Some patients explicitly reported that they were only willing if these were returned in original, unopened packages. Of patients who were not willing to use returned medication, most found it risky (64.1%) or did not want secondhand medication (41.1%). Other reasons included not knowing how medication were handled and stored by other patients and how quality could be monitored.

Men were more willing to use returned medication (OR 1.3 95% CI 1.1 to 1.6), as did patients with a high educational level (OR 1.8 95% CI 1.3 to 2.5, table 2). Furthermore, patients who regularly use 1–3 prescription medications were more willing to use returned medication (OR 1.3 95% CI 1.1 to 1.7), also patients who were questioned as they returned medication (OR 1.5 95% CI 1.0 to 2.3) and patients who had ever had unused medication themselves (OR 1.3 95% CI 1.1 to 1.6). Patients with non-Dutch cultural background were less willing to use returned medication (OR 0.3 95% CI 0.3 to 0.4). Age and type of pharmacy were not associated with patient willingness to use returned medication. Sensitivity analysis demonstrated similar associations.

## DISCUSSION

This study shows that a substantial proportion of patients are willing to use medication returned to the pharmacy by another patient when the quality is guaranteed. Males, patients with a high education, those regularly using medication, those returning medication to the pharmacy for disposal and those who ever had unused medication themselves were in particular more willing to use returned medication.

**Table 2** Patient characteristics associated with willingness to use medication returned by another patient (n=2136\*)

Characteristic	Total n=2136 (n (%))	Willing n=1310 (n (%))	Unwilling n=826 (n (%))	Crude OR (95% CI)	Adjusted OR* (95% CI)
Gender					
Female	1320 (61.8)	782 (59.7)	538 (65.1)	Ref.	Ref.
Male	816 (38.2)	528 (40.3)	288 (34.9)	<b>1.3 (1.1 to 1.5)</b>	<b>1.3 (1.1 to 1.6)</b>
Age					
18–40	716 (33.5)	402 (30.7)	314 (38.0)	Ref.	Ref.
41–65	887 (41.5)	580 (44.3)	307 (37.2)	<b>1.5 (1.2 to 1.8)</b>	1.2 (0.9 to 1.5)
>65	533 (25.0)	328 (25.0)	205 (24.8)	1.2 (1.0 to 1.6)	0.8 (0.6 to 1.1)
Educational level					
Low	250 (11.7)	124 (9.4)	126 (15.2)	Ref.	Ref.
Medium	1048 (49.1)	618 (47.2)	430 (52.1)	<b>1.5 (1.1 to 1.9)</b>	1.3 (0.9 to 1.7)
High	838 (39.2)	568 (43.4)	270 (32.7)	<b>2.1 (1.6 to 2.8)</b>	<b>1.8 (1.3 to 2.5)</b>
Cultural background					
Dutch	1664 (77.9)	1132 (86.4)	532 (64.4)	Ref.	Ref.
Other	472 (22.1)	178 (13.6)	294 (35.6)	<b>0.3 (0.2 to 0.4)</b>	<b>0.3 (0.3 to 0.4)</b>
Medications regularly used					
None	572 (26.8)	320 (24.4)	252 (30.5)	Ref.	Ref.
1–3	971 (45.4)	616 (47.0)	355 (43.0)	<b>1.4 (1.1 to 1.7)</b>	<b>1.3 (1.1 to 1.7)</b>
≥4	593 (27.8)	374 (28.6)	219 (26.5)	<b>1.3 (1.1 to 1.7)</b>	1.3 (1.0 to 1.7)
Type of pharmacy					
Community	1891 (88.5)	1146 (87.5)	745 (90.2)	Ref.	Ref.
Outpatient	245 (11.5)	164 (12.5)	81 (9.8)	1.3 (1.0 to 1.7)	1.2 (0.9 to 1.6)
Returning medication					
No	2000 (93.6)	1210 (92.4)	790 (95.6)	Ref.	Ref.
Yes	136 (6.4)	100 (7.6)	36 (4.4)	<b>1.8 (1.2 to 2.7)</b>	<b>1.5 (1.0 to 2.3)</b>
Ever having any unused medication					
No					
Yes	710 (33.2)	393 (30.0)	317 (38.4)	Ref.	Ref.
Don't know	1388 (65.0)	905 (69.1)	483 (58.5)	<b>1.5 (1.3 to 1.8)</b>	<b>1.3 (1.1 to 1.6)</b>
	38 (1.8)	12 (0.9)	26 (3.2)	–	–

Significant associations are shown in bold.

\*Multivariate logistic regression analysis was conducted.

†For 79 (3.6%) patients, sociodemographic data was missing. Associations between patient characteristics and willingness to use returned medication were analysed for the remaining 2136 patients.

Worldwide, increased attention is being paid to sustainable environment, including green pharmacy practices, of which redispensing represents an important component.<sup>19</sup> Patient support for redispensing is crucial.<sup>12–13</sup> Our findings in a large patient sample are consistent with previous, smaller, studies, which found that 50%–95% of patients would accept medication returned by other patients.<sup>15–17</sup> We found that patients who were less supportive primarily had concerns about risks, including tampering with the medication, inadequate storage conditions and reliability of the quality assurance. Few studies have identified patient barriers and facilitators to redispensing unused medication by pharmacies. Almahad *et al*<sup>14</sup> interviewed 19 patients ≥40 years and concluded

that many are in favour of redispensing because it could reduce the negative consequences of waste. Potential disadvantages identified by these patients included improper storage of medication, medication errors introduced by patients and counterfeit medication entering the system. We found that less willing patients had more often non-Dutch cultural backgrounds. Before considering implementation of redispensing, concerns of less willing patients should be identified in-depth and barriers should be overcome. Interventions aiming at behavioural changes may be required for ultimately increasing patient support, such as raising awareness on waste and using (monetary) incentives. Future studies should also identify the type of medication packages that can be redispensed

from a patient perspective, for instance, original manufacturer's packaging or also single blisters.

Although patients were found supportive of redispensing, implementation may not be cost-beneficial for all types of medication. In a micro-costing study, all pharmacy's additional process steps that are required to redispense unused medication in the pharmacy, including direct (labour and material) and indirect costs, were quantified (Bekker, accepted)<sup>20</sup>. The outcomes showed that redispensing is most cost-beneficial if applied to expensive medication. For low-cost medication, paying for the additional processing to guarantee the quality of returned medication will not outweigh the additional costs. To this end, redispensing may only be implemented for expensive medication. However, these substantially contribute to pharmaceutical spending, and if patients discontinue therapy frequently unused, expensive medication remains unused.<sup>3</sup> Implementing a redispensing process for expensive medication could lead to substantial cost savings.

Some patients were only willing to use redispensed medication if this were for cheaper or for free. Barriers may arise at providing redispensed medication at lower cost, because this may implicate a lower quality and could lead to lower adherence. Furthermore, if medications are provided at lower cost this will also influence the cost-benefit ratio, that will presumably increase, thereby lowering the types of medications that can be redispensed from an economical point of view.<sup>7</sup>

Concerns exist about increased risk of counterfeit medication entering the pharmaceutical supply and use chain during redispensing.<sup>14</sup> This will be tackled by the European Union directives 2011/62/EU and EU2016/161, which demand that manufacturers add tamper indicators and unique identification codes to the outer packaging of medication from 2019 to minimise the risk of falsification. Each unique package will be registered in a large repository, then during the dispensing to the patient its authenticity will be verified and the package will be unsubscribed from the database. Unfortunately, this directive will likely hamper redispensing, as returned medication cannot re-enter the database and thus cannot be verified during the subsequent redispensing. How to tackle this barrier should be further explored. For example, authorised persons such as pharmacists may be able to re-subscribe returned medication into the database.

This study captured the willingness on redispensing in a large patient sample. However, we cannot assure that this is identical if implemented in practice. No information on the number of patients who refused to participate was registered and therefore the response rate is unknown. Consequently, no conclusions can be drawn regarding patients' general willingness to participate in a study on medication waste. Furthermore, pharmacy visitors may not be representative of the general population; however, they may well reflect the most likely people to receive returned medication. Lastly, patients who returned medication to community pharmacies for disposal were

interviewed (n=142, 6.4%) and were found more willing to use redispensed medication compared with patients who answered in writing. These patients may have given what they considered to be socially desirable answers, and were briefly informed on the potential consequences of medication waste. Additionally, these patients may be more willing to discuss medication waste and possibilities for redispensing than patients who refused to participate, which may overestimate the outcomes.

## CONCLUSIONS

A substantial proportion of patients are willing to use medication returned unused to the pharmacy by another patient when the quality is guaranteed, suggesting that implementation of redispensing may be supported by patients.

## Author affiliations

<sup>1</sup>Department of Pharmacy, Sint Maartenskliniek, Nijmegen, The Netherlands

<sup>2</sup>Division Laboratories and Pharmacy, Department of Clinical Pharmacy, University Medical Centre, Utrecht, The Netherlands

<sup>3</sup>Department of Pharmacy, Radboud University Medical Centre, Nijmegen, The Netherlands

<sup>4</sup>Division Pharmacoepidemiology and Clinical Pharmacology, Faculty of Science, Utrecht Institute for Pharmaceutical Sciences, Utrecht, The Netherlands

<sup>5</sup>Faculty of Pharmaceutical Sciences, University of Iceland, Reykjavik, Iceland

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